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Goddard Space Flight Center
Greenbelt, Maryland

Subject: Type I Report for the reporting period 30 November 1972
to 31 January 1973.

Title: Geologic and Mineral and Water Resources Investigations
in Western Colorado (Proposal 026)

(GSFC Principal Investigator Identification No. UN209)

The primary objective of the Colorado School of Mines ERTS-1
Program is to analyze ERTS-1 data for identification and dis-
crimination of geological and hydrological phenomena in central
and western Colorado. To facilitate the achievement of this
objective, the research has been subdivided into the following
tasks:

- Task I. Analyze ERTS-1 data for identification and discrimination
of:
- A. lithology and surface composition
 - B. geologic structure
 - C. geomorphic phenomena
 - D. mineral resources
 - E. water resources
 - F. volcanic phenomena
- Task II. Determine the atmospheric affects on remote sensor data.
- Task III. Investigate and evaluate:
- A. the RBV and MSS data for task I, A through F
 - B. processing and enhancement techniques as applied to
ERTS-1 data
- Task IV. Educate graduate students and give experience to re-
search personnel in the use of satellite remote sensor
data.
- Task V. Submission of a final report (Type III) which will dis-
cuss in depth the history of the overall project and
all significant scientific and technical theories,
procedures, techniques, equipment, tests and project
results.

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(E73-10041) GEOLOGIC AND MINERAL AND
WATER RESOURCES INVESTIGATIONS IN WESTERN
COLORADO Progress Report, 30 Nov. 1972
- 31 Jan. 1973 (Colorado School of
Mines) 3 p HC \$3.00

During the report period investigators have done detailed interpretation, analysis and evaluation of ERTS-1 data for various areas in central and western Colorado. The first areas interpreted were areas in which the investigators were familiar. Ground control for the interpretation and analysis was provided by high- and low-altitude photography, field data obtained during the summer of 1972, and previously existing geologic maps and publications. The first phase of research at CSM consists of doing case history type studies of the ERTS-1 data in conjunction with Tasks I, III and IV. This phase familiarizes the investigators with ERTS-1 type data and at the same time provides for development of interpretation methods and criteria.

The 9-inch positive transparencies were viewed and interpreted on a standard photointerpretation light table with a Bausch and Lomb Zoom 240 stereoscope at low magnification. Whereever possible images were viewed stereoscopically. The imagery of each area studied was evaluated for the various aspects of Task I, however the main emphasis during this report period was placed on the discrimination and identification of lithology and geologic structure.

Lithologic discrimination was fairly successful in some of the areas between the adjacent rock types listed below:

- 1) Paleozoic limestones/Tertiary andesite lavas in the Marshall Pass-Sargents area
- 2) Cretaceous shales/Cretaceous limestones in the Canon City area
- 3) Tertiary ash-flow tuff/Tertiary andesite lavas in the Bonanza area
- 4) Tertiary ash-flow/Tertiary basalt in the Bonanza area
- 5) Tertiary argillic-altered andesite/unaltered andesite in the Bonanza area
- 6) Tertiary monzonite porphyry/Tertiary and Cretaceous sandstones, shales and siltstones in the Trinidad-Walsenberg area
- 7) Tertiary basalt sills/Cretaceous shales in the Trinidad-Walsenberg area

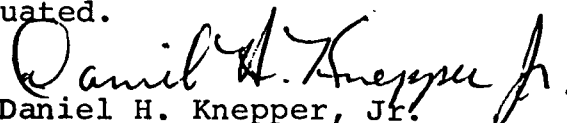
Lithologic discrimination could not be made between the following rock types:

- 1) Pikes Peak Granite/Cripple Creek and Silver Plume Granites between Lake George and Cripple Creek Colorado
- 2) Precambrian gneisses/Tertiary andesite lavas in the Bonanza area

Many major and minor structural features were discriminated and identified on the ERTS-1 imagery. Structural features are generally best seen when the image is viewed stereoscopically. ERTS-1 data has been shown to give new information regarding the extent of known structural features and their relationships to the regional geologic setting. For example, two major faults in the Marshall Pass-Sargents area previously mapped as separate faults appear on the ERTS-1 imagery as parts of one major through-going fault. The area surrounding Pikes Peak appears on the ERTS-1 imagery as a topographically high, oval-shaped area separated from the surrounding terrain by small fractures or faults. Detailed ground data in the area indicate that the observed faults or fractures outline a center of Precambrian plutonism associated with the emplacement of the Pikes Peak batholith.

Progress of ERTS-1 data analysis, interpretation and evaluation is proceeding on schedule. Current funding appears to be adequate for meeting the stated objectives of the CSM/ERTS-1 project. A letter requesting that Daniel H. Knepper, Jr. be named Acting Principal Investigator, replacing Dr. Robert G. Reeves, was sent to the ERTS contracting offices, but no official action had been taken at the time of this report.

During the next reporting period ERTS-1 data will continue to be analyzed, interpreted and evaluated. MMC activities will include ground measurements at time of satellite overpass and video processing and color additive viewing of ERTS-1 imagery. The Colorado School of Mines will conduct parallel color additive viewing experiments using an I²S Mini-Addcol Color Additive Viewer. In addition to lithology and structure emphasis will be placed on identification and discrimination of water and mineral resources and volcanic and geomorphic phenomena during the next reporting period. Effects of snow cover on geologic interpretation of ERTS-1 imagery will also be evaluated.


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